

# MITSUBISHI RF POWER TRANSISTOR 2SC2097

## NPN EPITAXIAL PLANAR TYPE

### DESCRIPTION

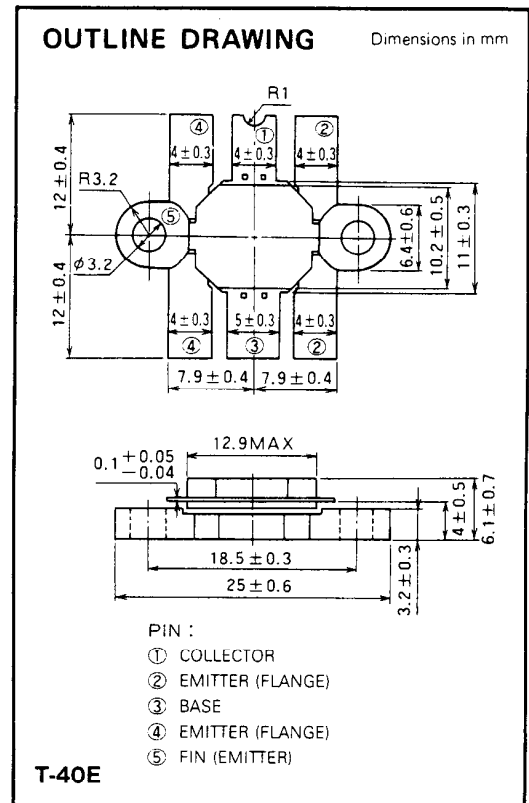
2SC2097 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in HF band mobile radio applications.

### FEATURES

- High power gain:  $G_{pe} \geq 12.3\text{dB}$   
@  $V_{CC} = 13.5\text{V}$ ,  $P_O = 75\text{W}$ ,  $f = 30\text{MHz}$
- Emitter ballasted construction for good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding infinite load VSWR when operated at  $V_{CC} = 15.2\text{V}$ ,  $P_O = 70\text{W}$ ,  $f = 30\text{MHz}$ ,  $T_C = 25^\circ\text{C}$ .

### APPLICATION

HF band linear power amplifiers in push-pull class AB operation.



### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol     | Parameter                    | Conditions               | Ratings    | Unit                      |
|------------|------------------------------|--------------------------|------------|---------------------------|
| $V_{CB0}$  | Collector to base voltage    |                          | 50         | V                         |
| $V_{EB0}$  | Emitter to base voltage      |                          | 5          | V                         |
| $V_{CE0}$  | Collector to emitter voltage | $R_{BE} = \infty$        | 20         | V                         |
| $I_C$      | Collector current            |                          | 15         | A                         |
| $P_C$      | Collector dissipation        | $T_a = 25^\circ\text{C}$ | 7.5        | W                         |
|            |                              | $T_C = 25^\circ\text{C}$ | 150        | W                         |
| $T_j$      | Junction temperature         |                          | 175        | $^\circ\text{C}$          |
| $T_{stg}$  | Storage temperature          |                          | -55 to 175 | $^\circ\text{C}$          |
| $R_{th-a}$ | Thermal resistance           | Junction to ambient      | 20         | $^\circ\text{C}/\text{W}$ |
|            |                              | Junction to case         | 1.2        | $^\circ\text{C}/\text{W}$ |

Note. Above parameters are guaranteed independently.

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

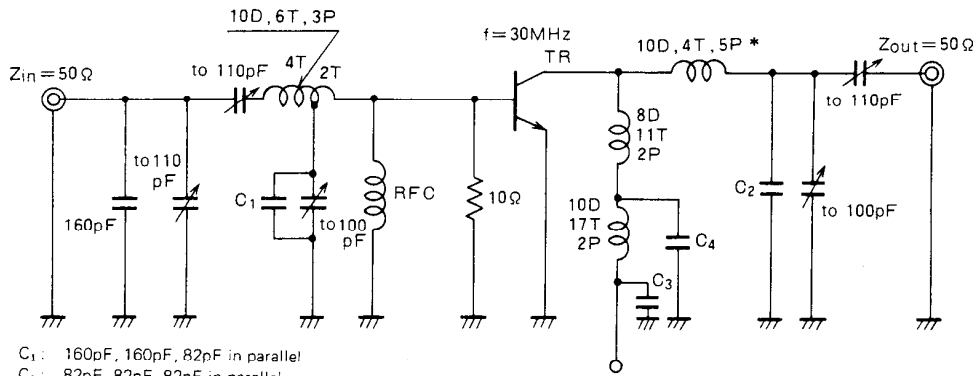
| Symbol        | Parameter                              | Test conditions   | Limits |     |     | Unit |
|---------------|--|---|--------|-----|-----|------|
|               |  |   | Min    | Typ | Max |      |
| $V_{(BR)EBO}$ | Emitter to base breakdown voltage      | $I_E = 10\text{mA}$ , $I_C = 0$                                     | 5      |     |     | V    |
| $V_{(BR)CB0}$ | Collector to base breakdown voltage    | $I_C = 20\text{mA}$ , $I_E = 0$                                     | 50     |     |     | V    |
| $V_{(BR)CE0}$ | Collector to emitter breakdown voltage | $I_C = 0.1\text{A}$ , $R_{BE} = \infty$                             | 20     |     |     | V    |
| $I_{CB0}$     | Collector cutoff current               | $V_{CB} = 25\text{V}$ , $I_E = 0$                                   |        |     | 5   | mA   |
| $I_{EB0}$     | Emitter cutoff current                 | $V_{EB} = 2\text{V}$ , $I_C = 0$                                    |        |     | 4   | mA   |
| $h_{FE}$      | DC forward current gain*               | $V_{CE} = 10\text{V}$ , $I_C = 0.1\text{A}$                         | 10     | 50  | 180 | —    |
| $P_O$         | Output power                           | $V_{CC} = 13.5\text{V}$ , $P_{in} = 4\text{W}$ , $f = 30\text{MHz}$ | 75     | 85  |     | W    |
| $\eta_C$      | Collector efficiency                   |   | 55     | 65  |     | %    |

Note. \*Pulse test,  $P_W = 150\mu\text{s}$ , duty=5%.

Above parameters, ratings, limits and conditions are subject to change.

**NPN EPITAXIAL PLANAR TYPE**

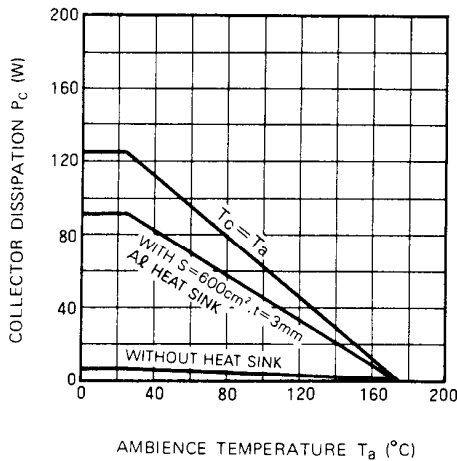
**TEST CIRCUIT**



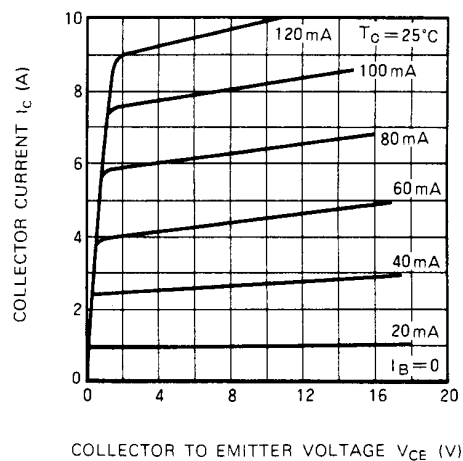
- C<sub>1</sub>: 160pF, 160pF, 82pF in parallel  
 C<sub>2</sub>: 82pF, 82pF, 82pF in parallel  
 C<sub>3</sub>: 100pF, 4700pF, 4700pF, 0.22μF, 0.22μF, 33μF, 330μF in parallel  
 C<sub>4</sub>: 100pF, 220pF, 4700pF, 0.1μF, 330μF in parallel  
 RFC: 1mmφ enameled wire 27T.
- Notes: All coils are made from 1.5mmφ silver plated copper wire but coil (sign \*) is made from 2.3mmφ  
 D: Inner diameter of coil      P: Pitch of coil  
 T: Turn number of coil      Dimension in milli-meter

**TYPICAL PERFORMANCE DATA**

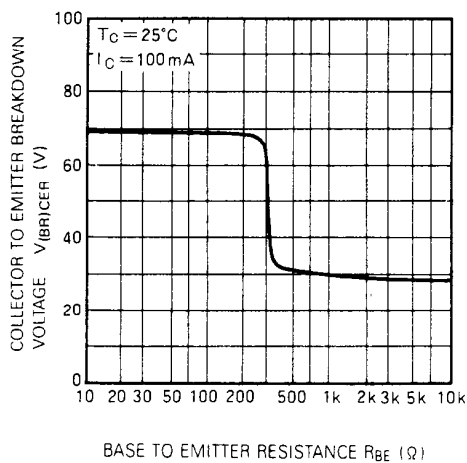
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



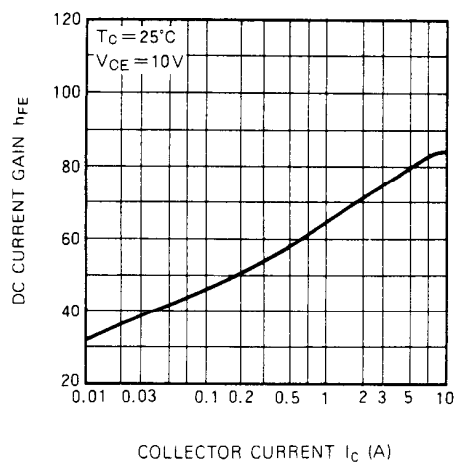
**COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE**



**COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO EMITTER RESISTANCE**

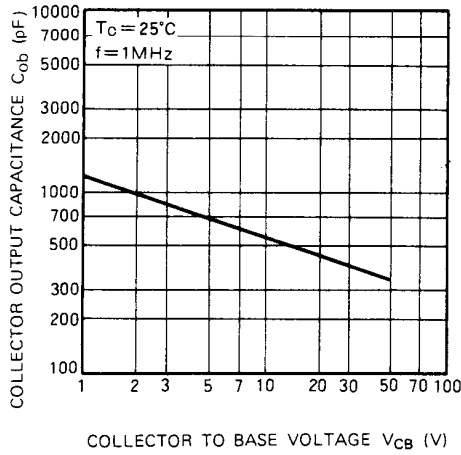


**DC CURRENT GAIN VS. COLLECTOR CURRENT**

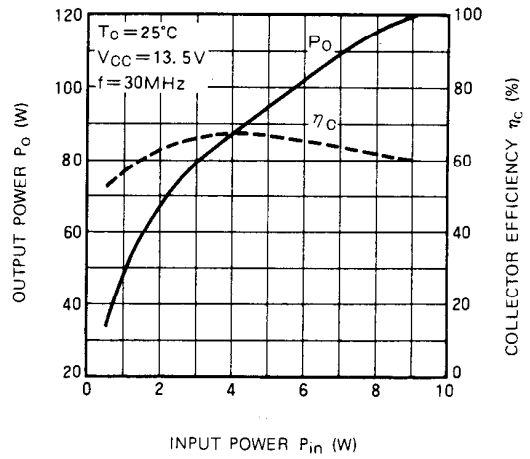


**NPN EPITAXIAL PLANAR TYPE**

**COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE**



**OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER**



**OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE**

